



ELECTRONIC TUBE REFERENCE

16WP4A

Specialized - Cathode Ray electronic tube

CONSOLIDATED TECHNICAL DATA

1 SECTION
CONSTRUCTION
CATHODERAY

P4 cathode-ray display tube documented for high-voltage direct-view operation, using magnetic deflection and manufacturer-specified beam focusing and control arrangements appropriate to type 16WP4A.

GENERAL CHARACTERISTICS

BASE DESIGNATION	12N	BASE PINS	5
NOMINAL HEATER	6.3 V / 600 mA	PARALLEL HEATER	– / –
HEATING	Indirect	SERIES OPERATION	Not specified
CATHODE ARRANGEMENT	Separate cathodes	SECTION CONSTRUCTION	Similar

SECTION RATINGS

SECTION 1 Cathode Ray

MAXIMUM PLATE VOLTAGE	16000 V
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CRT-specific anode, focus, deflection and optical data retained as parameters rather than forced into ordinary plate/screen fields.

16WP4A — Magnetic-Focus and -Deflection Cathode-Ray Picture Tube

An all-glass, direct-view cathode-ray tube designed for television receiver applications, featuring magnetic focus, magnetic deflection, and a gray filter faceplate.

Overview

The **16WP4A** (also designated as **16WP4-A**) is a 16-inch round, glass-envelope cathode-ray picture tube. It is designed primarily for direct-view television applications, providing a picture size of approximately 14 1/2 by 10 7/8 inches with rounded sides (or a nominal raster size of 10 1/4 by 14 1/2 inches). The tube

incorporates magnetic focus and magnetic deflection with an approximate deflection angle of 70 degrees. It features an electron gun designed to operate with an external double-field ion-trap magnet.

A key physical feature of the 16WP4A is its spherical gray filter faceplate, which is engineered to enhance picture contrast and detail under high ambient light conditions. The 16WP4A is identical to the [16WP4](#) except for the addition of an external conductive coating. When grounded, this external coating acts as a high-voltage filter capacitor for the anode power supply.

Mechanical Specifications and Physical Design

The 16WP4A is constructed with a round glass bulb designated under the ASA designation J127D. The tube is designed to be mounted in any position. Its physical dimensions and mechanical limits are as follows:

- **Overall Length:** 17 3/4 ± 3/8 inches
- **Greatest Bulb Diameter:** 15 7/8 ± 1/8 inches
- **Minimum Useful Screen Diameter:** 14 1/2 inches
- **Neck Length:** 7 7/16 inches
- **Neck Diameter:** 1 7/16 ± 1/16 inches
- **Approximate Net Weight:** 15 1/2 pounds

The faceplate is spherical and tinted gray, providing a light transmission at the center of approximately 70% to 73%.

Electrical connections to the internal gun structure are made through a small-shell Duodecal 5-pin base (JETEC No. B5-57). The basing configuration is designated as 12N for the 16WP4A, whereas the non-coated [16WP4](#) uses the [12D](#) basing configuration. The high-voltage anode connection is made via a recessed small-cavity cap (JETEC No. J1-21) located on the bulb cone. The anode contact aligns with the Pin No. 3 position within an angular tolerance of ±10 degrees or ±30 degrees depending on the manufacturing standard.

Heater and Pin Connections

The 16WP4A utilizes a unipotential cathode with an indirectly heated filament. The heater is designed for operation from either AC or DC sources.

Heater Parameter	Value
Nominal Heater Voltage	6.3 V
Nominal Heater Current	0.6 A (with a ±10% tolerance)

The 12N basing diagram provides the following pin connections, viewed from the bottom of the base:

Pin Number	Connection
Pin 1	Heater

Pin Number	Connection
Pin 2	Grid No. 1 (Control Grid)
Pin 10	Grid No. 2 (Screen Grid / Accelerator)
Pin 11	Cathode
Pin 12	Heater
Anode Cap	Anode (internally connected to Grid No. 3)

Optical and Phosphor Characteristics

The screen of the 16WP4A utilizes Phosphor No. 4 (P4), which is a sulfide-type phosphor. Its optical characteristics include:

- **Fluorescent Color:** White
- **Phosphorescent Color:** White
- **Persistence:** Short to medium

Electrical Ratings and Interelectrode Capacitances

The direct interelectrode capacitances of the tube's electron gun are relatively low, minimizing loading effects:

- **Cathode to all other electrodes:** Approximately 5 μF
- **Grid No. 1 to all other electrodes:** Approximately 6 μF
- **External conductive coating to anode (16WP4A only):** Minimum of 750 μF , maximum of 1500 μF

The maximum ratings are established under the design-center system:

- **Maximum DC Anode Voltage:** 16,000 V
- **Maximum DC Grid No. 2 Voltage:** 410 V
- **Maximum Grid No. 1 Voltage:**
 - DC negative-bias value: 125 V
 - DC positive-bias value: 0 V
 - Positive-peak value: 2 V
- **Maximum DC Peak Heater-Cathode Voltage:**
 - Heater negative with respect to cathode: 125 V (During warm-up periods not exceeding 15 seconds, some specifications permit a transient peak of up to 410 V)
 - Heater positive with respect to cathode: 125 V
- **Maximum Grid No. 1 Circuit Resistance:** 1.5 Megohms

Typical Operating Conditions and Adjustments

For typical television application service, the operating parameters are defined as follows:

- **DC Anode Voltage:** 12,000 V (Anode voltage should generally not be operated below 10,000 V, as brightness and focus quality decrease significantly at lower potentials)
- **DC Grid No. 2 Voltage:** 250 to 300 V
- **DC Grid No. 1 Voltage (for visual extinction of the focused spot or raster):** -27 to -63 V, or -28 to -72 V
- **Magnetic Focusing:** Focusing is achieved using an external magnetic focusing coil, such as a standard RETMA No. 109 coil or equivalent. Under typical operating conditions, the focusing-coil current is approximately 104 to 110 mA DC. The recommended position for the center of the focusing field (the air gap of the focus coil) is 3 to 3 1/4 inches from the yoke reference line.
- **Ion-Trap Magnet:** The electron gun requires an external double-field ion-trap magnet to prevent ion burn on the phosphor screen. When using a standard RETMA No. 108 ion-trap magnet, the coil current should be adjusted to approximately 120 mA, which corresponds to an approximate field intensity of 35 Gauss at the optimum position. The space on the neck of the tube must be kept clear to accommodate this magnet.

Technical Summary

The **16WP4A** is a 16-inch round glass cathode-ray tube featuring magnetic focus and deflection, a 70-degree deflection angle, and a gray filter faceplate. It operates with a 6.3 V, 0.6 A heater and is rated for a maximum anode voltage of 16,000 V. The inclusion of an external conductive coating on the 16WP4A provides a built-in filter capacitance of 750 to 1500 μF when grounded, distinguishing it from the non-coated [16WP4](#). With its standard P4 white phosphor and robust design-center ratings, the 16WP4A serves as a reliable direct-view display component in classic television receiver designs.



SOURCE OPERATING CONDITIONS

1961 Tung Sol

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1961 TUNG SOL

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum Anode Voltage	16000 V	—
Typical Anode Voltage	12000 V	—
Maximum Grid2 Voltage	410 V	—
Typical Grid2 Voltage	250 V	—

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
FocusingMethod	Magnetic	—
DeflectingMethod	Magnetic	—
DiagonalDeflectionAngleApproximate	70 degree	—
PhosphorNumber	4	—
FluorescentColor	White	—
Persistence	Medium	—



SOURCE OPERATING CONDITIONS

[SOURCE PDF](#)

1966 Tung Sol Electronic Tubes 4 of 4

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1966 TUNG SOL ELECTRONIC TUBES 4 OF 4

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Maximum DC grid 2 voltage	410 V	—
Maximum grid 1 negative-bias voltage	125 V	NegativeBias
Maximum grid 1 positive-bias voltage	0 V	PositiveBias
Maximum grid 1 positive-peak voltage	2 V	PositivePeak
Peak heater-cathode voltage	410 V	HeaterNegativeWarmup
Peak heater-cathode voltage	125 V	HeaterNegativeAfterWarmup
Peak heater-cathode voltage	125 V	HeaterPositive
DC anode voltage	12000 V	TypicalOperation
DC grid 2 voltage	250 V	TypicalOperation
DC grid 1 voltage	-27--63 V	TypicalOperation
Focusing coil current	110 mA	Approximate
Ion trap current	120 mA	Approximate
Faceplate transmission at center	70 %	Approximate

CHARACTERISTIC		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
Deflection angle	70 degrees	Approximate

CAPACITANCE		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
External conductive coating to anode capacitance	1500 pF	Maximum
External conductive coating to anode capacitance	750 pF	Minimum



SOURCE DATA APPENDIX

1968 General Electric Co

Published test conditions and operating points. Values on this page are preserved as reported by this source.

1968 GENERAL ELECTRIC CO

Section 1 · Cathode Ray

OTHER		
PARAMETER	PUBLISHED VALUE	CONDITION / NOTE
AnodeVoltageMaximum	16000 V	—
AnodeVoltageTypical	12000 V	—

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